

January 1953

Test 496: Case SC Gas

Nebraska Tractor Test Laboratory Submitted by Larsen Museum
University of Nebraska-Lincoln

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Department of Agricultural Engineering
Dates of test: June 15 to June 20, 1953.
Manufacturer: J. I. CASE COMPANY, RACINE,
WISCONSIN.
Manufacturer's rating: Not Rated.

NEBRASKA TRACTOR TEST NO. 496

CASE SC

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury		
		Gal per hour	Hp-hr per gal	Lb per hp-hour		Cooling med	Air			
TEST B—100% MAXIMUM LOAD—TWO HOURS										
31.71	1600	2.967	10.69	0.574	0.00	178	68	28.890		
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR										
29.68	1600	2.608	11.38	0.539	0.00	186	80	28.900		
TEST D—RATED LOAD—ONE HOUR										
28.05	1600	2.463	11.39	0.539	0.00	185	85	28.890		
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)										
28.09	1602	2.482	11.32	0.543	...	186	86	...		
1.13	1805	1.231	0.92	6.690	...	144	86	...		
15.42	1756	1.921	8.03	0.765	...	170	88	...		
26.00	1445	2.267	11.47	0.535	...	193	88	...		
7.87	1783	1.578	4.99	1.231	...	158	90	...		
21.81	1652	2.140	10.19	0.602	...	174	90	...		
16.72	1674	1.937	8.63	0.711	0.00	171	88	28.900		
TORQUE (at dynamometer)										
RPM	1596	1494	1394	1301	1204	1106	992	894	799	705
Lb.-ft.	211.8	211.8	205.8	203.4	201.8	205.5	210.0	206.0	199.2	194.3

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cooling med	Air	
TEST F—100% MAXIMUM LOAD—2nd Gear											
27.68	2919	3.56	1599	6.34	.....	Not Recorded	.....	198	91	28.600
TEST G—OPERATING MAXIMUM LOAD											
25.28	4072	2.33	1603	13.04	.....	Not Recorded	.....	180	83	28.560
26.15	2742	3.58	1600	5.83	.....	Not Recorded	.....	194	93	28.570
26.24	1958	5.03	1599	4.12	.....	Not Recorded	.....	194	94	28.570
23.57	843	10.48	1606	1.93	.....	Not Recorded	.....	186	101	28.600
TEST H—RATED LOAD—TEN HOURS—2nd Gear											
22.41	2347	3.58	1599	5.67	2.344	10.28	0.597	0.00	178	92	28.520
TEST J—OPERATING MAXIMUM LOAD—2nd Gear											
25.48	2706	3.53	1609	6.92	.....	Not Recorded	.....	180	91	28.540
TEST K—OPERATING MAXIMUM LOAD—2nd Gear											
25.42	2834	3.36	1603	8.76	.....	Not Recorded	.....	175	85	28.540

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	168 lb each	None	None
Added cast iron	435 lb each	None	None
Rear tires			
No. and size	Two 11-38	Two 11-38	Two 10-38
Ply	6	6	4
Air pressure	14 lb	12 lb	12 lb
Front wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 5.50-16	Two 5.50-16	Two 5.50-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	17 inches	17½ inches	16½ inches
Static weight			
Rear end	4726 lb	3520 lb	3478 lb
Front end	1311 lb	1312 lb	1312 lb
Total weight as tested with operator	6212 lb	5007 lb	4965 lb

HORSEPOWER SUMMARY

	Draw-bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	29.81	33.09
2. Observed maximum horsepower (tests F & B)	27.68	31.71
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	22.36	28.13

We, the undersigned, certify that this is a true and correct report of official tractor test No. 496.

L. F. LARSEN
Engineer in charge

C. W. SMITH
L. W. HURLBUT
F. D. YUNG
Board of Tractor
Test Engineers

FUEL, OIL and TIME Gasoline octane No ASTM 76 Research 82 (rating taken from oil company's typical inspection data); weight per gallon 6.139 lb Oil SAE 20; to motor 1.237 gal; drained from motor 1.134 gal. Total time motor was operated 44 hours.

CHASSIS TYPE Tricycle Serial No SC8032498 Tread width rear 44" to 80" front 7½" and 13" Wheel Base 83 3/16" Hydraulic control system Direct engine drive with independent throw-out lever Advertised speeds mph first 2½ second 3½ third 5 fourth 10½ reverse 3 Belt pulley diam 9¼" face 6¾" rpm 1112 Belt speed 2790 fpm Clutch single plate clutch operated by foot pedal Seat weather proof cushion seat which tilts upward and suspended on adjustable rubber in torsion Brakes double disk brakes operated by two foot pedals Equalized by locking together Power take-off direct engine drive with independent hand clutch.

ENGINE Make J. I. Case Type 4 cylinder vertical Serial No SC8032498 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and Stroke 3¾" x 4" Rated rpm 1600 Compression ratio 6.25 to 1 Displacement 165.1 Port Diameter Valves Inlet 1 9/32" Exhaust 1½" Governor variable speed centrifugal Carburetor Size 1 3/16" Ignition System magneto Starting System 6 volt battery Air Cleaner oil washed wire mesh Muffler was used Oil Filter replaceable treated paper element Cooling medium temperature control thermostat.

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with carburetor set for 100% maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H, J and K were made with an operating setting of the carburetor (selected by the manufacturer) of 94.7% of maximum belt horsepower.

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The throttle valve is held wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is held wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors, which have an altogether different fuel system.

TEST D: The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E:

Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads of 20 minutes each: rated load, no load, $\frac{1}{2}$ rated load, maximum load at wide open throttle valve, $\frac{1}{4}$ and $\frac{3}{4}$ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same dirt test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same throughout the season.

The same tires, wheels and weights are used for all tests except J and K.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.

